Gifts of the Forest

A **Wood Magic Forest Fair** learning station for 4th graders

2023 edition (new science standards highlighted in yellow)

Objective

Students will be able to describe several environmental, social, and economic benefits of our forests.

Overview

Students will explore what benefits forests provide for man and the environment; first in terms of wood products, then with regard to wildlife habitat, soil and water quality protection air and noise filtering, recreation, social benefits, and economic benefits (such as jobs).

2021 SC Science Standards

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function together in a system to support survival, growth, behavior, and reproduction.
4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and how their uses affect the environment.
4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Materials List

11" X 17" signs (plastic with stick-on letters) for the following categories:
WILDLIFE, SOIL & WATER PROTECTION, AIR FILTERS, JOBS, RECREATION
Several large gift-wrapped boxes.
2 wooden boxes – one with dirt only and one with moss or other vegetative cover
2 watering cans filled with water
air conditioner filter
fresh hardwood twig with branches
basket of wood pellets
backpack
fishing pole
binoculars
forester gear (vest, hardhat)
deer antlers
2 glass jars
"Web of Life" supplies – several rolls of string, laminated cards labeled for each component of the forest – see appendix to this lesson plan for front and back of cards
3 dollar bills of any denomination

Preparation

Set up "Web of Life" in a large (15' diameter) circle. Cards are to be hung about 2 feet apart from a string that is about 3 feet above the ground (supported by stakes in the ground). The gift-wrapped boxes should be placed at the base of a pole of the tent that the students pass as they sit down. The signs (categories, such as "WILDLIFE", etc.) are to be placed in a bag at the front of the teaching area.

Step-by-Step Procedures

1. Introduce yourself and ask them, "Did anybody notice any items on the ground as you walked in?" (Kids will say "gifts.")
2. Tell them, "Our forests give us many gifts and I want to see how much you know about what we get from our forests. Some of those gifts are products we use but some of those gifts are environmental services that help people and the planet. Who can raise their hand and tell me one thing we get from our forests?"

3. Have a student volunteer to come up and draw one of the gift signs out of the bag. Whichever one they pull out, lead a discussion on that one and have the volunteer child hold/wear the prop or do the experiment relating. Repeat this until all signs are drawn. See below for discussion points on each sign:

BIOENERGY

a. Wood waste, scraps, tree limbs, and wood that isn't large enough or of good enough quality to be processed into a solid wood product are often used at a mill to generate electricity or steam for heating. It can also be ground up and pressed into pellets.
b. The pellets can be burned at a power station, instead of coal, to generate electricity for us to use.
c. The good thing about wood pellets is that is that they are a carbon-neutral energy source. The carbon released when wood is burned isn't like the carbon that's released when coal is burned. Coal is an energy source that contains ancient carbon that's been locked up for millions of years. The carbon released from burning wood isn't old and trees take that carbon back in as they grow.
d. Bioenergy from wood scraps and pellets comes from a renewable resource…TREES! Energy from coal comes from a nonrenewable energy source.

WILDLIFE

a. As a forest is growing wood to be harvested later, it is also providing homes for wildlife.
b. Each stage of succession – from 1-year old plantations to mature stands – the forest provides for the habitat needs of different species of wildlife.
c. Having different ages, types of trees, and "thickness" of forests is important in order to have what many different kinds of animals need – having just old trees isn't adequate.

SOIL AND WATER PROTECTION AND FLOOD REDUCTION

Ask them how trees help in this, bringing out the following points:

a. Trees' leaves and branches intercept hard rain, softening its impact on soil. This help keep the topsoil in place playing a vital role in the soil's composition.
b. Trees' roots branch out in all directions, up to 4 times their height, holding soil in place like hundreds of tiny hands.
c. Holding soil keeps sediment out of streams (sediment can reduce the ability of fish to see their food and can limit the amount of sunlight available for photosynthesis).
d. Trees soak up stormwater that could cause flooding. 60 gallons of water run-off is avoided and 443 gallons of rainfall is intercepted each year by a single tree(USDA Forest Service research).

Illustrate soil and water protection by pointing out the two wooden soil holders. "Which area do you think will hold the soil in place better when it rains?" [One with forest litter on it.] Pour water slowly over the bare soil, then over the forest litter – can be collected in a jar to compare (optional). "If you were a fish, would you rather live in a stream that runs through a forest or through a cleared lot? Your water would be a lot cleaner if trees were helping to hold the soil during hard rains.

AIR FILTERS

"Did you know that trees act like huge filters, trapping dust and smoke sort of like an air conditioner filter does [*show filter*]? Sometimes filters get clogged up. This can happen to a tree, also. If a tree's filters (leaves) get clogged up, it may die."

Ask "What do tree's give off that we breathe?"
Oxygen. Discuss the fact that trees take in and sequester, or hold onto, carbon dioxide and give off oxygen, and that they also filter other gases that are pollutants – like ozone and sulfur dioxide. CO_2 is a natural greenhouse gas in the air that traps heat from the sun keeping our planet warm enough for life. CO_2 concentrations in the atmosphere have increased as humans have burned more fossil fuels and cleared more forests and is causing the

earth's temperature to rise. Trees store carbon by making it part of their living tissue. Forests and wood products, like the lumber that goes into the construction of a home, hold onto or sequester carbon keeping it out of the atmosphere.

Mention that something else that trees filter is noise. Have them think about a time when they were in a noisy room and then stepped around the corner. "It was a lot quieter on the other side of the wall, wasn't it? Trees act kind of like walls – they block noise from cars, noisy neighbors, or whatever."

RECREATION

Ask students what types of recreation someone could do in the woods (ex, fishing, camping, hiking, wildlife viewing, etc). **"**Raise your hand if you have ever been mountain biking, hiking, hunting, fishing, or camping. Think about how different it would have been if there had not been any trees in the park or forest where you did these things. Trees provide great places to have fun, and in the fall some folks hop in the car and drive to the mountains just to look at them! Trees make people feel better about themselves – I know I prefer to be in an area with a bunch of trees instead of somewhere where there aren't any."

JOBS

Say, "Let's think about the impact that forests have on our wallets." Pull out your wallet and drop a couple of bills from the air. "How many of you like to get money? Well, we need all need money for food and clothes and a lot of other things. Did you know that over 90,000 people in South Carolina rely on forests for their jobs. These people work in the forest (foresters, geologists, hydrologists, biologists) or in forest products manufacturing facilities." To help the students relate to the economic impact of forestry, have them think about a forester who works for a timber company. With her income she can buy a house, a car, food at the grocery store, clothing from the mall, etc. Have them consider how this person's spending affects dozens of others – realtors, car salesmen, grocery clerks, etc. "So human activity can be beneficial in terms of jobs and also affect the land at the same time."

7. Say, "Now, we're going to play a game called, 'Web of Life.' "Let's walk over to this circle. Everyone stand behind a card. Look at the back of the card and read what kind of an animal or plant you are. Then read what other animal or plant you need. Let's start over here with _____ (child's name)." Give them the end of the string and ask him/her what they need. Carry the roll of string with you to the other student, unrolling it as you go. Continue in this manner until all of the students are holding the string. Discuss with them how important all of the parts of the forest are and how they all depend on one another. Explain to them that foresters must consider more than just the trees when they are deciding what needs to be done in the forest. For example, sometimes they will thin a forest or prescribe burn it so more plants will grow that will provide food for deer or turkey.

8. SCRIPT FOR WEB OF LIFE:

a. **Student to Paper**: Most paper is produced from wood chips. The chips are ground into a pulp and chemicals and dyes are added. The pulp is sprayed onto a mesh screen to make a mat that is rolled, dried, and then cut into different sizes.

b**. Paper \to Bioenergy**: Wood pellets can be burned at a power station, instead of coal, to generate electricity to help power the paper mill.

c. **Bioenergy to Logger:** During a tree harvest, the wood waste, scraps, tree limbs, and wood that isn't large enough or of good enough quality can be processed into wood pellets.

d. **Logger to Forest:** Forests grow trees which are harvested and sold to a mill. The logger and the workers earn money selling the trees.

e. **Forest to Sun/Water/CO2**: Forests need energy from the sun, water from the soil, and carbon dioxide from the air to produce their own energy to grow.

f. **Sun/Water/CO2 to Sourwood:** Sourwood trees grow to maturity and then produce flowers with pollen. The pollen travels to other flowers and then new seeds develop. These seeds fall to the ground to grow into new trees.

Commented [BF1]: The sentence on this card is still confusing to me. It sounds like the wood pellets are being made at the paper mill. Maybe instead it could say, "You need BIOENERGY to be generated to help power the paper mill."

Commented [BF2]: On the card, maybe change the words "growth factors" to resources. Or at least the word factors to resources. Growth factors sound a little funny.

g. **Sourwood to Honey Bee**: Sourwood trees provides nectar for bees, which is turned into honey for the bee population to thrive.

h. **Honey Bee to Red Maple Tree**: Red maple trees are dependent on the honeybees to pollinate their flowers.

i. **Red Maple** tree **to Nature Photographer**: The red maple tree and its red leaves provide beautiful pictures for the photographer before the leaves fall during the autumn season.

j. **Nature Photographer to Woodpeckers**: Nature photographers capture the beauty of trees and other plants, wildlife, and the landscape with their cameras. The photographs can be sold to earn income and educate the public about wildlife and plant communities.

k. **Woodpecker to Snags:** A snag is a standing dead tree from which most of the branches have fallen. Snags frequently provide homes and food for wildlife, like most woodpeckers.

l. **Snag to Decomposers:** A decomposer is a plant or organism that feeds on dead material and causes its mechanical or chemical breakdown. Fungi, bacteria, and invertebrate organisms like worms, beetles, and pill bugs (roly-polys) are examples.

m. **Decomposer to Soil**: Decomposers add nutrients to the soil that are needed for plant growth and also create tunnels and spaces in the soil to allow air and water (needed by plant roots) to infiltrate the soil.

n. **Soil to Grasses and Shrubs:** Nutrients in the soil dissolve into water and then are absorbed by plants' roots. Nutrients are needed to grow and keep a plant healthy…just like a person!

o. **Grasses and Shrubs to Clean Stream:** Plants are vital in stopping erosion. Their roots hold onto soil particles and keep dirt out of the water source. We can plant trees along a riverbank to help protect water quality.

p. **Clean Stream to Fish:** The clean stream acts a natural home for fish. They are able to have offspring in this safe sheltered area.

q. **Fish to Bald Eagle:** The fish is the prey for this bald eagle, the predator. This is just one example of a small food chain.

r. **Bald Eagle to Forester:** The bald eagle needs mature tall trees in a forest to provide nesting areas. A forester can manage a forest to help provide wildlife habitat. Forests need foresters to ensure growth and health of the forest ecosystem.

s. **Forester to Trees:** The main objective of a forester is to be able to identify, care for, and manage all the trees in the forest so the forest can provide environmental, economic, and social benefits for the landowner or the public.

t. **Tree to Leaves:** The trees grow leaves which capture solar energy, produce their own food (stored energy), sequester carbon, produce oxygen, and clean the air.

u. **Leaf to Houses:** Leaves on trees provide shelter and cover for some animals and cool shade for rivers, animals, and people's homes so they don't have to use as much energy to run their air conditioning.

v. **House to Tree Products:** Many houses are made from lumber which comes from trees. Many of the items we purchase at the grocery store contain components of trees. Did you know that cinnamon, chewing gum, cosmetics, soap, even vanilla ice cream (artificially flavored) are all wholly or partially made from trees?!

w. **Tree Product to We:** We get so many benefits from trees!

Wrap-Up

Review with them the categories of the "gifts" of the forest - WILDLIFE, SOIL & WATER PROTECTION, AIR FILTERS, JOBS & RECREATION, and BIOENERGY. Emphasize the fact that each of them has a higher quality of life because of these forest benefits, which are available to them while the trees are growing. Say, "So, forests are like factories – making a future product (lumber, paper, etc.). But, have you ever been to a factory that improves the environment, makes people feel better just by looking at it, or provides a home for wildlife in its buildings? And, remember, if we take care of trees and plant them back when we cut them, we can have all of these benefits – FOREVER!"